

Part 1 - Pending Claims in Clean Form

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1. (Original) A varactor comprising:
a diode junction;
a depletion region adjacent to the diode junction; and
a doped region including the depletion region and having a
5 nonuniform dopant concentration profile that increases with increasing depth of the doped region from the diode junction;
and wherein the nonuniform dopant concentration profile causes the varactor to have an approximately linear capacitance/voltage response characteristic.
2. (Original) A varactor as defined in claim 1 wherein:
the doped region includes a peak dopant concentration region
outside the depletion region; and
the peak dopant concentration region forms a conductive path to and
5 from the varactor.
3. (Amended) A varactor as defined in claim 1 wherein:
the nonuniform dopant concentration profile is defined by an
equation $N=Bx^m$, where N is the dopant concentration, x is the depth of the
doped region, B is a concentration constant and m is an exponent that determines
5 the degree of curvature of the dopant profile.
4. (Original) A varactor as defined in claim 3 wherein m is greater than
zero.
5. (Original) A varactor as defined in claim 3 wherein m is about 3.
6. (Original) A varactor as defined in claim 3 wherein:
 B is in a range from about $1.0E13/cm^3$ to about $1.0E19/cm^3$; and
 m is greater than zero.
7. (Original) A varactor as defined in claim 6 wherein B is about
 $1.0E16/cm^3$.

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8. (Amended) A varactor for use in an integrated circuit comprising:
a semiconductor substrate;
a first side of the varactor formed in the semiconductor substrate and
being doped with a first type of dopant in a retrograde dopant profile;
a second side of the varactor formed in the semiconductor substrate
adjacent the first side and being doped with a second type of dopant; and
a portion of the first side adjacent the second side forming a
depletion region within the first side upon applying a voltage bias between the first
side and second side, the dopant profile in the first side creating a capacitance
between the first side and the second side that is linearly variable in response to
differing magnitudes of the applied voltage bias.

9. (Original) A varactor as defined in claim 8 wherein:
the retrograde profile of the first type of dopant in the first side
includes an increasing dopant concentration with increasing depth from the
second side to a peak concentration region; and

5 the peak concentration region functions as a conductive path to and
from the varactor.

10. (Original) A varactor as defined in claim 8 wherein:
the first side is a generally horizontal bottom side; and
the second side is a top side generally parallel to the bottom side.

Part 2 – Pending Claims with Markings and Indications to Show Changes

1. (Original) A varactor comprising:
 - a diode junction;
 - a depletion region adjacent to the diode junction; and
 - a doped region including the depletion region and having a
- 5 nonuniform dopant concentration profile that increases with increasing depth of the doped region from the diode junction;
 - and wherein the nonuniform dopant concentration profile causes the varactor to have an approximately linear capacitance/voltage response characteristic.
2. (Original) A varactor as defined in claim 1 wherein:
 - the doped region includes a peak dopant concentration region outside the depletion region; and
 - the peak dopant concentration region forms a conductive path to and
- 5 from the varactor.
3. (Amended) A varactor as defined in claim 1 wherein:
 - the nonuniform dopant concentration profile is defined by an equation $N=Bxm$ $N=Bxexp(m)$, where N is the dopant concentration, x is the depth of the doped region, B is a concentration constant and m is an exponent that
- 5 determines the degree of curvature of the dopant profile.
4. (Original) A varactor as defined in claim 3 wherein m is greater than zero.
5. (Original) A varactor as defined in claim 3 wherein m is about 3.
6. (Original) A varactor as defined in claim 3 wherein:
 - B is in a range from about 1.0E13/cm³ to about 1.0E19/cm³; and
 - m is greater than zero.
7. (Original) A varactor as defined in claim 6 wherein B is about 1.0E16/cm³.

8. (Amended) A varactor for use in an integrated circuit comprising:
 - a semiconductor substrate;
 - a first side of the varactor formed in the semiconductor substrate and being doped with a first type of dopant in a retrograde dopant profile;
 - 5 a second side of the varactor formed in the semiconductor substrate adjacent the first side and being doped with a second type of dopant; and
 - a depletion region formed within portion of the first side adjacent the second side forming a depletion region within the first side upon applying a voltage bias between the first side and second side, the voltage bias also dopant profile in
 - 10 the first side creating causing a capacitance between the first side and the second side that is linearly variable with in response to differing magnitudes of the applied voltage bias.
9. (Original) A varactor as defined in claim 8 wherein:
 - the retrograde profile of the first type of dopant in the first side includes an increasing dopant concentration with increasing depth from the second side to a peak concentration region; and
 - 5 the peak concentration region functions as a conductive path to and from the varactor.
10. (Original) A varactor as defined in claim 8 wherein:
 - the first side is a generally horizontal bottom side; and
 - the second side is a top side generally parallel to the bottom side.